apparatus may be fully activated, i.e. the display may be switched on or the like. Resistive touch detection may consume less energy, why it may be chosen as the detection mode upon which the apparatus is activated initially.

[0046] Further embodiments provide switching on the voltage applied to the first conductive layer upon sensing zero current from second conductive layer within the second electrode. Zero current is sensed, for example, when the pressure is removed from the first conductive layer, resulting in no further contact between the first conductive layer and the second conductive layer. A user might have selected a certain content and precise position detection is not required anymore. The zero current detection may be coupled to a time lag. Only when the zero current is measured for a certain amount of time, the resistive touch detection may be deactivated and the capacitive touch detection re-activated.

[0047] A further aspect of the application is a an apparatus, for example a touch sensor, with first conductive means arranged for forming a first conductive layer with first and second electrodes, second conductive means arranged for forming a second conductive layer with third electrodes, spacer means arranged for spatially spacing the first conductive means from the second conductive means, the first electrodes being arranged at least for capacitive touch detection and the second and third electrodes being arranged for resistive touch detection.

[0048] These and other aspects of the application will be apparent from and elucidated with reference to the detailed description presented hereinafter. The features of the present application and of its exemplary embodiments as presented above are understood to be disclosed also in all possible combinations with each other.

BRIEF DESCRIPTION OF THE FIGURES

[0049] In the figures show:

[0050] FIG. **1** a side view of a touch sensor according to embodiments;

[0051] FIG. **2** a sectional view of a display panel with a touch sensor according to embodiments;

[0052] FIG. **3** a block diagram of a circuit for feeding a touch sensor with signals according to embodiments;

[0053] FIG. **4***a* an illustration of field lines on a conductive layer according to embodiments;

[0054] FIG. **4***b* an illustration of field lines of a conductive layer according to embodiments;

[0055] FIG. **5** a top view of a mobile multimedia device;

[0056] FIG. **6** a first flowchart of a method according to embodiments;

[0057] FIG. **7** a second flowchart of a method according to embodiments;

[0058] FIG. **8** a third flowchart of a method according to embodiments.

DETAILED DESCRIPTION OF THE INVENTION

[0059] FIG. **1** illustrates a first conductive layer **2**, a spacer **4**, and a second conductive layer **6**. The first conductive layer **2** may be made of a flexible material. The first conductive layer **2** may be made of Indium-Tin-Oxide. The first conductive layer **2** may be arranged as a flexible matrix. The second conductive layer **6** may be made of a stable material. The second conductive layer **6** may be made of Indium-Tin-Oxide. The second conductive layer **6** may be arranged on a stable substrate or within a stable matrix. The spacer **4** may be made of an insulating material. The first conductive layer **2** may be positioned above spacer **4** and spacer **4** may be positioned above second conductive layer **6**. The illustration is an exploded view of an apparatus according to embodiments.

[0060] For operating the touch sensor, the first conductive layer **2**, the spacer **4**, and the second conductive layer **6** are stacked on top of each other building a monolithic structure.

[0061] First conductive layer **2** has on its corners four first electrodes **8**, and on an edge, spatially located apart from the corners of the first conductive layer **2** second electrodes **10**. First electrodes **8** and second electrodes **10** may be arranged such that they are capable of applying a voltage and a current onto the first conductive layer as well as sensing a current and a voltage on the first conductive layer **2**.

[0062] In the area of the first electrodes **8** and the second electrodes **10**, the spacer **4** may be arranged. The spacer **4** may be ring-shaped thus forming a carrier around all edges of the second conductive layer **2**. The spacer **4** may, however, also be shaped to be only positioned in the area of the first electrodes **8** and the second electrodes **10**.

[0063] The second conductive layer **6** may be arranged, such that third electrodes **12** are arranged within its corners. The third electrodes **12** allow applying a voltage and a current onto second conductive layer **6** as well as sensing a current within second conductive layer **6**.

[0064] The first conductive layer **2** may be, as explained above, formed of a flexible material. A user may depress first conductive layer **2** with its finger or a stylus pen such that it comes into contact with second conductive layer **6**. A point of contact between first conductive layer and second conductive layer needs to be evaluated for a touch sensor, as will be described hereinafter.

[0065] FIG. **2** illustrates a sectional view of a display with a touch sensor in simplified form. As can be seen, first conductive layer **2** with first electrodes **8**, and third electrodes **10** is positioned above spacer **4**. Spacer **4** provides for a spatial distance between the lower surface of first conductive layer **2** and the upper surface of second conductive layer **6**. Below second conductive layer **6**, a supporting substrate **14**, for example glass, may be positioned, for supporting the second conductive layer **6**. Below the supporting substrate **14**, a display device **16** may be arranged. As first conductive layer **2**, and second conductive layer **6**, as well as the supporting substrate **14** may be transparent, an image displayed on display device **16** may be seen through the layers **2**, **4**, **14**.

[0066] In operation, the display device **16** may illustrate a user interface, as will be seen in FIG. **5**.

[0067] The first conductive layer **2** may be used for capacitive touch detection using the first electrodes **8**. The first conductive layer **2** together with the second conductive layer **6** may be used for resistive touch detection using the second electrodes **10** and the third electrodes **12**. For combined capacitive and resistive touch detection, the first electrodes **8** need to be connected by four wires, and the second electrodes **10** and the third electrodes **12** need to be connected by five additional wires with appropriate measurement units, i.e. means for sensing currents and/or voltages with drivers for applying currents and/or voltages. Thus, overall nine wires allow for capacitive and resistive touch detection. For capacitive and resistive touch detection, the electrodes **8**, **10**, **12** need to be fed with appropriate signals, as will be explained in conjunction with FIG. **3**.

[0068] FIG. **3** illustrates schematically the wiring of first conductive layer **2** and second conductive layer **6**. As illus-